

# Product Review

## Sony MDS-JE440 MiniDisc Deck

Reviewed by Gary Galo

*Sony MDS-JE440 MiniDisc Deck. Sony Electronics, Inc., Consumer Audio Division, 1 Sony Drive, Park Ridge, NJ 07656. 1-800-222-7669 or (941) 768-7669, FAX (941) 768-7790, [www.sel.sony.com](http://www.sel.sony.com). Suggested retail price: \$250.*

The MDS-JE440 is Sony's bottom-of-the-line MiniDisc deck (*Photo 1*). It is intended to be used as a component within a complete home audio system, and not for portable use (for portable field recording, Sony manufactures a complete line of portable MiniDisc recorders with microphone inputs). The MDS-JE440 is styled to match Sony's CDP-XE400 and XE500 Compact Disc players (reviewed in *audioXpress* August 2001).

### MINIDISC BASICS

The MiniDisc has been around for nearly ten years. Sony introduced it in 1992 as a means of making digital recording affordable to the consumer. The MiniDisc has the same sampling rate and bit rate as the Compact Disc. But, the MiniDisc is only 2½" in diameter. In order to achieve the same recording and playing time as the CD, a severe amount of data compression—about 5:1—is used during the recording process.

Sony's compression system is known as ATRAC, for Adaptive TRAnsform Acoustic Coding. In developing the ATRAC system, Sony employed psychoacoustic principles to determine what types of information loss are the least readily discernible to the human ear. In the early years of the MiniDisc, the format's sound quality left a great deal to be desired. The MiniDisc seemed like a giant step backwards—at a time when the CD was beginning to sound like music, the MiniDisc was a return to the harsh, edgy, dry sound of early digital audio.

Much has changed since the intro-



**PHOTO 1:** The Sony MDS-JE440 MiniDisc Deck and supplied remote control. This entry-level component MiniDisc recorder is intended for use with a complete audio system, and matches the styling of Sony's CDP-XE400 and XE500 CD players.

duction of the format. Sony has continued to improve the ATRAC system, and their compression algorithms have evolved to the point where the MiniDisc is now gaining some respect, especially among those who need a portable recording system of reasonably high quality. The MDS-JE440 uses Sony's DSP Type R algorithms, which Sony calls ATRAC 3.

### RECORDING

The MiniDisc is a magneto-optical recording format using the Sony Magnetic Field Modulation system, which uses both heat and magnetism. During recording, the laser beam heats the recording medium, while a magnetic field applied to the other side of the disc leaves a perma-



**PHOTO 2:** Sony Premium Gold MiniDisc. The media is only 2½" in diameter, and the case measures only 2 13/16 × 2 11/16".

nent impression in the particles in the disc's recording layer. This system is a significant departure from conventional magneto-optical (MO) recorders, as explained in a link on Sony's website:



**PHOTO 3:** Inside the MDS-JE440. A handful of proprietary Sony chips make up most of the circuitry.

<http://www.sel.sony.com/SEL/rmeg/mediatech/techspec/techMD.html>.

Conventional MO recorders employ a fixed magnetic field, switching the laser beam on and off. With this system, a portion of the disc must be completely erased before you can record on it. This requires separate erase and record passes, doubling the time it takes to make a recording, or separate erase and record lasers, which significantly increase the complexity and the cost. The MiniDisc overcomes this problem by keeping the laser beam constant and varying the magnetic field.

## PLAYBACK

In playback, a low-level laser beam is used, one that does not heat the disc.

The changes in magnetic polarity cause the polarization angle of the reflected light to change. Pre-recorded MiniDiscs are manufactured using a molding process, but the reflections from the molded surface are compatible with the MiniDisc's laser pickup. All MiniDisc players are designed to play both pre-recorded and recordable MiniDiscs.

HBB, manufacturer of some of the finest professional CD and MiniDisc recorders and media available, has published an excellent guide to the various current digital recording formats. This document is available for download in .PDF format. Go to <http://www.hbb.co.uk/usa.htm>, and click on "Brochures, Manuals and Ads," then click on "Brochures." Look for "A Guide to

Choosing and Using Digital Audio Recording Media."

*Photo 2* shows a Sony Premium Gold MiniDisc, which is housed in a small plastic cartridge measuring only  $2\frac{13}{16} \times 2\frac{11}{16}$ ". These premium MiniDiscs are manufactured with a shock-absorbing mechanism that reduces the transmission of vibrations made by the recorder or player to the disc itself. They are available five to a pack for around \$15 in retail stores. Sony and several other manufacturers make cheaper media for less critical applications.

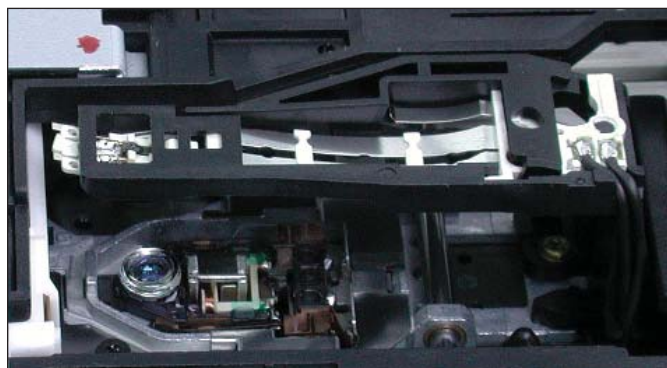
## INSIDE THE DECK

*Photo 3* shows the inside of the MDS-JE440. Nearly all of the circuitry is contained in proprietary Sony surface-mount integrated circuits. The A/D and D/A converters use Sony's Wide Bit Stream technology. The A/D converters are 24-bit, and the Hybrid Pulse D/A converter operates in conjunction with an 8x oversampling digital filter.

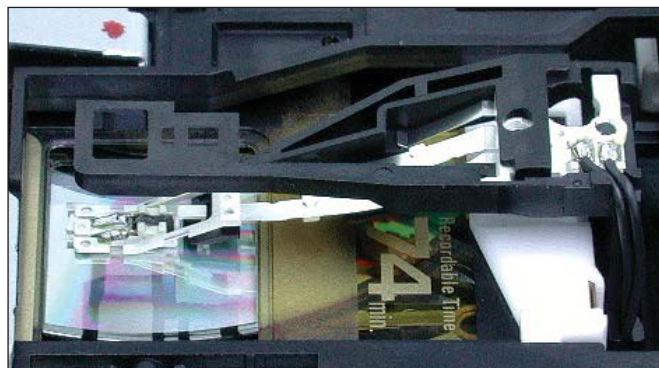
Surface-mount IC op amps are used for the analog amplification circuitry. My unit was supplied with 4570 types—these are not listed on the NJR website, but it is probably safe to assume that they are superior to the usual 5532 or 4558 types still found in some consumer gear. The MDS-JE440 contains a conventional (i.e., non-switching) power supply.

*Photo 4* is a close-up of the mechanism. The laser assembly faces upward, toward the bottom of the MiniDisc. The magnet assembly is located above the laser assembly.

*Photo 5* shows the same close-up with a MiniDisc inserted, and the play-



**PHOTO 4:** Close-up of the mechanism, showing the laser and magnet assemblies.



**PHOTO 5:** Close-up of the mechanism with disc inserted and the deck in the record mode. The magnet assembly makes physical contact with the top side of the MiniDisc.



## TABLE 1 MANUFACTURER'S SPECIFICATIONS

System: MiniDisc digital audio system  
Media speed: 400 to 900 rpm (CLV)  
Error correction: Advanced Cross Interleave Reed Solomon Code  
Sampling frequency: 44.1kHz  
Coding: ATRAC-3  
Modulation system: EFM (Eight-to-Fourteen)  
Number of channels: 2 (stereo)  
Frequency response: 5Hz–20kHz,  $\pm 0.3$ dB  
Signal-to-noise ratio: 96dB  
Wow and flutter: Below measurable limit  
Analog input: 500mV RMS; 47k $\Omega$   
Headphone output: 28mW; 32 $\Omega$   
Analog out: 2V RMS; 50k $\Omega$   
Power consumption: 15W  
Dimensions: 17  $\times$  3 $\frac{3}{4}$   $\times$  11 $\frac{1}{4}$ "  
Weight: 6 lbs 10 oz

er operating in the record mode. During recording, the magnet assembly actually makes physical contact with the top side of the disc. Like Sony's low-end CD players, the MDS-JE440 is quite solidly built.

### FEATURE-LOADED DECK

The MDS-JE440 comes with stereo analog inputs and outputs, plus a Toslink optical digital input. (A more expensive model, the MDS-JE640, also has a Toslink digital output, plus Toslink and S/PDIF coax digital inputs.) The digital input is intended for making digital copies of CDs, DATs, or any other digital format from a player with a Toslink output.

Making digital copies of commercial CDs that you already own is perfectly legal as long as the copies are for your personal use. Making copies of your friend's CDs is not legal. The MDS-JE440 uses the Serial Copy Management System, which allows you to make a first-generation digital copy of a commercial CD, but you will not be able to make subsequent copies from the first-generation copy. The MDS-JE440 has a built-in sampling rate converter, allowing you to make digital copies from 32kHz or 48kHz sources, as well as the standard 44.1kHz.

In the conventional stereo mode, you can record up to 74 minutes on a MiniDisc. But, the MDS-JE440 has three additional modes that allow longer recording time. The LP2 and LP4 stereo modes allow two or four times the normal recording time, respectively. There

is a corresponding loss of fidelity, however, since the level of data reduction increases at a rate proportional to the increase in recording time.

There is also a mono mode, which gives double the recording time, but with the same fidelity as the normal stereo mode. Recordings made using the LP2 or LP4 mode can only be played on MiniDisc players supporting the LP format (not all do).

Using the basic recording and playback functions on the MDS-JE440 is as simple as operating a cassette deck. The bar-graph recording level indicator is not active until you press the LEVEL/DISPLAY/CHAR button. The deck allows you to adjust the recording level for both analog and digital inputs.

If you have a CD that was recorded at a low level, the MDS-JE440 allows you to change the level while making a direct digital copy. I know of few professional CD recorders or DAT recorders that allow you to change recording levels while recording via the digital inputs (HHB, Marantz, and Sony have recently introduced professional CD recorders with this feature). This can be an extremely useful feature, and I'm amazed to find it in a low-cost consumer product (and I wish that I had it in my professional CD recorder).

When the level indicator is not active, time and track information is displayed. Unlike most DAT or CD recorders, the level indicator will not function during playback.

The MDS-JE440 is loaded with features. The Synchro-recording feature automatically copies track numbers from a CD when digital copying is used. You can manually add index points during the recording process by simply pressing the RECORD button.

During playback, you can select specific tracks either with the remote control or by turning the AMS (Automatic Music Sensor) button. This is the same AMS system used by Sony in their low-cost CD players. The deck allows you to repeat a specific track, and also has shuffle play. You can even produce your own program by selecting specific tracks for playback, in whatever order you choose.

Editing functions are also included

on the MDS-JE440. The deck allows you to erase a specific track or even a portion within a track. You can also divide a track already recorded by adding a new track number within an existing track. You can also combine tracks by eliminating a previous track number. Whenever you add or remove track numbers, the remaining tracks are automatically renumbered. You can also move tracks around, changing the order in which the various tracks appear, and you can add names to previously recorded tracks. The MDS-JE440 even allows you to change the recorded level of any track, after that track has been recorded! You can reverse any editing operation with the UNDO function. A full-featured remote control is supplied with the deck, and runs on a pair of AA batteries (supplied by Sony).

### HOW DOES IT SOUND?

I evaluated the sonic performance of the MDS-JE440 by making copies of some of my reference CD tracks onto MiniDisc via the Toslink digital interconnect and listening to the results using the player's analog outputs connected to my main system. The MiniDisc was not intended to compete sonically with the Compact Disc, and indeed it does not. But, I was surprised that the results were as good as they were.

The MiniDisc dubs show a dryness and a loss of ambience. The soundstage is also reduced in size, and there is a slight edge in the high frequencies and a graininess added to the texture. Note, however, that I auditioned this unit with my reference system. A system such as mine is an unlikely place for a MiniDisc deck to reside. When matched with components of comparable price and quality, the degradation caused by the digital compression will be subtle, or may go unnoticed altogether.

I remember how distressed I was with the sound of CD players back in the late-1980s. The MDS-JE440 sounds considerably better than a stock Philips/Magnavox player from that vintage (a CDB460, for example; we still have dozens of these in service at The Crane School of Music, so finding one for comparison was no problem).

I also copied several CDs using the deck's analog inputs, fed from my pre-amp's tape outputs. The sound quality was not quite as good as the direct digital copies, but quite respectable nonetheless. Used via its digital or analog inputs, the MDS-JE440 is sonically superior to any analog cassette deck I've used.

One obvious place for the MiniDisc is in applications where portability is important. Many people who jog, walk, or otherwise like to spend time on the go with their music find portable CD players just a bit too large to be convenient. I often see people jogging while carrying a portable CD player in hand—a nuisance to be sure. Portable MiniDisc players are now available that are barely larger than the disc itself—they are truly “pocket-size.”

The MDS-JE440 is an ideal recorder for making copies of CDs for portable use. At our music school, a number of students and faculty have found the MiniDisc format ideal for making recordings of rehearsals, and even audition tapes. Again, the MiniDisc sounds considerably better than an analog cassette, and is well-suited to this purpose.

Mated with a couple of affordable microphones and one of the small Behringer mixers (July 2001 review), the MDS-JE440 can form the core of a respectable low-cost digital recording system. Behringer's bottom-of-the-line MX602A, with a street price of less than \$100, will be ideal where only two microphones are needed. The MiniDisc deck won't equal the quality of a DAT recorder, but unless you're pressing commercial CDs from your material, you may find the format to be quite satisfactory.

## CONCLUSIONS

The MiniDisc has come a long way in the last ten years. It is not, and was never intended to be, a high-end, audiophile quality recording format. But, the sound quality of the MDS-JE440 is nothing short of remarkable for the price. The street price of the MDS-JE440 is now less than \$200, and I find it quite amazing that this level of sonic performance, plus such an abundance of features, can be built into such an inex-

pensive consumer product.

There are many applications where the sonic performance of the MiniDisc

will more than fit the bill. For those applications, the MDS-JE440 deserves a solid recommendation. ♦